What Went Wrong in Cleveland?

Know the Rules When it Comes to Glass Balustrades

by Donn Harter

The demand for glass balustrades increased dramatically with the advent of the code requirement stating that no opening in a railing system may be larger than through which a 4-inch sphere may pass. Metal and wood railings have virtually disappeared in favor of the unrestricted view they provide. Consequently, a new phenomenon has developed.

Glass in Balusters

The building code requirement for glass in balusters may be one of the following:

1. Single fully-tempered glass;
2. Laminated fully-tempered glass;
3. Laminated heat-strengthened glass.

Since the code permits monolithic tempered glass in baluster design, it is the least expensive and therefore the most popular. The phenomenon or built-in hazard that is inherent in some batches of tempered glass, is the presence of an invisible seed or pellet known as nickel sulfide. This seed is believed to be present in one out of 10,000 lites of tempered glass. This seed grows steadily until it causes sudden and total destruction of the glass *(see USGlass April 1998, "Temper, Temper," page 66)*.

A celebrated example of this baluster failure was witnessed recently at the Cleveland Stadium where several of the lites simply blew up and fell to the seats below. There are more than 1,800 balusters in the Cleveland Stadium. Fortunately there were no spectators in the stadium at the time or potential injury could have been very serious. This does not constitute a code violation but does point out the need for code change where balustrades are located above walking or seating locations.

The greatest area of code violation is the omission of the top rail or handrail on a balustrade. This is generally prescribed by the architect or demanded by the owner. In either case it is distinctly in violation of the code.

Code Language

The building code states the following: "Each handrail or guardrail section shall be supported by a minimum of three glass balusters or otherwise supported so that it remains in place should one baluster fail." This means that there must be a top rail or handrail attached to the balusters, or the top rail or handrail shall be attached to a post or wall at each end.

Just a few miles from Cleveland's skyline, the Cleveland Stadium was the site of a baluster failure when several of more than 1,800 lites crashed to the seats below.

The Cleveland Stadium balustrade design was in code violation since there was no top rail. The balusters of approximately 18 inches in height were located on top of a 24-inch pony wall. The codes require a rail on the top of the glass at a minimum of 42 inches above the walking surface. This requirement is designed to protect a person who is leaning on the railing from falling if the baluster fails. Owners and architects object to the rail because it is vision block at that point. Too bad! Life safety is more important. The utilization of a top rail may have reduced the amount of fragmented tempered glass that vacated the opening.

Developing a Solution.

The California Glass Association (CGA) has a Task Group working on glass railing systems, which would develop national standards for life safety design. There will be a number of guidelines developed and published to help guide architects and contract glaziers in the proper design. Certainly, one of the recommendations will be the use of tempered or heat-strengthened laminated glass where an unprotected walking surface exists below. We will support any American Society for Testing Materials endeavors in this area. In the meantime, something must be done and the CGA is embarking on offering some sound practices with a nationally recognized group of railing experts. This group includes architects, engineers, building officials, manufactures, and contract glaziers. The finished product will not compromise design, but will save lives.

the author

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